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Decoupling of Spurious Deep Bound States with the Similarity Renormalization Group[1] K.A. WENDT, R.J. FURNSTAHL, R.J. PERRY, The Ohio State University — The Similarity Renormalization Group (SRG) is a continuous series of unitary transformations that can be implemented as a flow equation. When the relative kinetic energy (T_{rel}) is used in the SRG generator, nuclear structure calculations have shown greatly improved convergence with basis size because of the decoupling of high-energy and low-energy physics. However this generator can sometimes be problematic. A test case is provided by a study of initial interactions from chiral effective field theories with large cutoffs, which can lead to spurious deep bound states. We would like the SRG to decouple these from the physical shallow bound states. However, with T_{rel} the high- and low-energy bound states are not decoupled in the usual sense. Replacing T_{rel} by the momentum-space diagonal of the Hamiltonian (H_d) in the SRG generator does produce decoupling, such that the shallow states are in the low-momentum region and the deep bound states are at higher momentum. The flow toward universal low-momentum interactions is also restored.

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